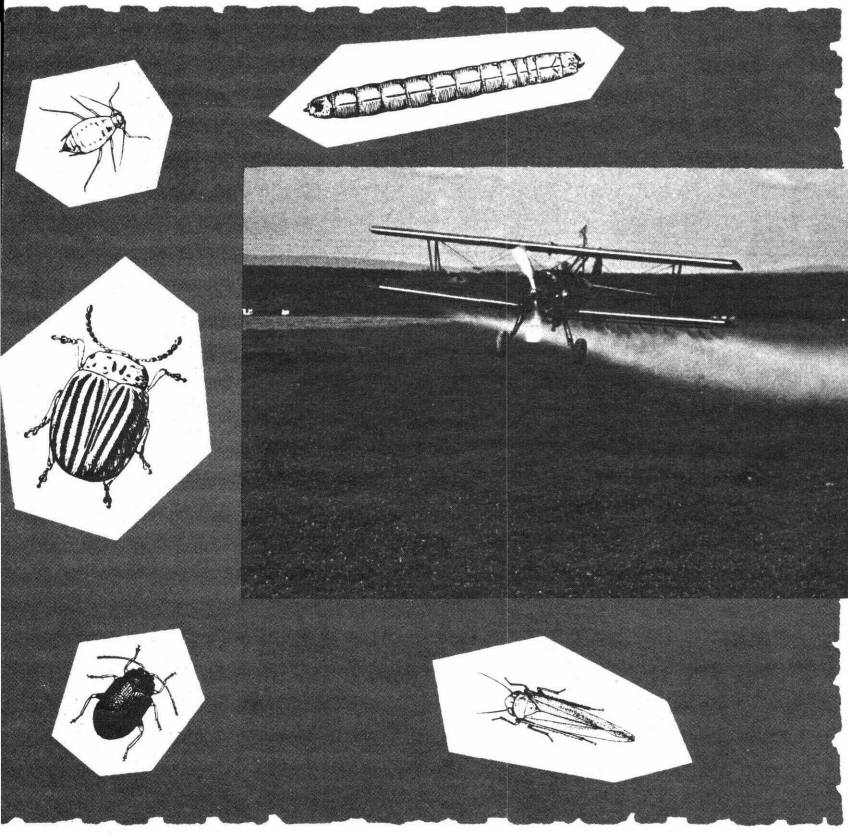
CONTROLLING POTATO INSECTS



Farmers' Bulletin No. 2168
U.S. DEPARTMENT OF AGRICULTURE

This bulletin is addressed to commercial potato growers. Home gardeners should refer to Home and Garden Bulletin 46, "Insects and Diseases of Vegetables in the Home Garden," available free from the U.S. Department of Agriculture, Washington, D.C. 20250; send your request on a postal card. For descriptions of insect pests of potatoes and information on their biology and habits, refer to Agriculture Handbook 264, "Potato Insects: Their Biology and Biological and Cultural Control," available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, at 30 cents a copy.

If you need help in identifying the pests that are damaging your potatoes, or in selecting the proper insecticide, consult your county agricultural agent or Extension Service entomologist.

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Washington, D.C. Revised May 1965

This edition replaces all previous editions of this publication.
Because of changed insecticide recommendations, earlier copies should be destroyed.

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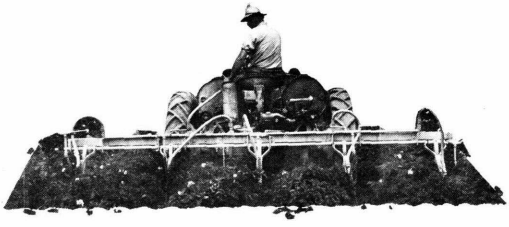
CONTROLLING POTATO INSECTS



By W. A. Shands, B. J. Landis, and W. J. Reid, Jr., entomologists,
Entomology Research Division, Agricultural Research Service

Wherever potatoes are grown in the United States, the use of insecticide usually is necessary to protect the crop from damage by insects and related pests. Cultural and biological methods of control are of value but are not adequate.

No one insecticide will control all kinds of potato insects, and a given insecticide may be more effective in one area than in another. Select the proper dust, spray, or poison bait; apply it carefully, at the right time and recommended dosage.

Insecticides are applied to potato foliage to control some pests, but may need to be applied on the soil, in the soil, or on nearby vegetation to control others.

SELECTING INSECTICIDE

The table beginning on page 10 lists kinds and amounts of insecticides to use to control potato insects. Recommendations frequently differ from one area to another; also, they differ according to whether the crop is intended for table use or for seed.

You can control insects on potato foliage by applying either dusts or sprays with ground equipment or aircraft. Sprays are more practical than dusts in areas where it is necessary to control both insects and late blight—for example, in the northeastern part of the country.

Sprays are generally more effective than dusts. Also, they do not drift so far on adjacent crops.

Dusts may be preferred where water is scarce or inconvenient to obtain, and also when sulfur is to be added to the mixture. Row-crop dusters compact the soil less than sprayers that carry large amounts of water.

If you spray, miscible or emulsifiable concentrates are satisfactory for use in either high- or low-gallonage equipment. Some paste-type concentrates and coarsely ground wettable powders may cause clogging of spray nozzles, especially when low gallonages of spray are applied.

Thorough coverage of the foliage is desirable for many insecticides when applied in either dust or spray form, and is especially desirable if a fungicide for late blight is included. However, thorough coverage of the foliage is not particularly desirable for endosulfan, for certain organophosphate insecticides that kill by fumigation as well as by contact, or for systemic insecticides. Although thorough coverage is difficult to achieve with aircraft, satisfactory control of insects can be obtained with as little as 5 to 8 gallons of spray per acre by carefully choosing the insecticides to be used.

Systemic Insecticides

Satisfactory control of aphids, certain kinds of leafhoppers, the Colorado potato beetle, and the potato flea beetle has been obtained with systemic insecticides for long periods of time in different parts of the country. In the northeastern quarter of the country Di-Syston granules applied in the fertilizer band or in the furrow at planting time have given satisfactory seasonal control and also retarded the spread of insect-borne virus diseases.

In one seed-producing area of the northeastern quarter of the country, equally good control has been obtained with a demeton spray applied to very small plants.

Additional applications of systemic insecticides to the foliage may be required when the crop is one-half to three-quarters grown, particularly in areas with long growing seasons.

Keep close watch on the effectiveness of a systemic insecticide, so that you will be ready to act if effectiveness is lost and insects require control.

Equipment for applying granules is available for mounting on the planter or tractor tool bar. Consult your agricultural agent or Extension Service entomologist about the performance of various systemic insecticides on potatoes in your area.

Seed Potatoes

Insect-control requirements are usually much more exacting for potatoes grown for seed than for those grown for table use. Crops grown for seed of good quality must be protected throughout the season from infection with any of several virus diseases carried by insects, chiefly aphids and leafhoppers.

Many varieties of potatoes grown for table use will tolerate current-season infections of virus diseases and moderate injury from chewing insects without appreciable loss in yield or quality. However, leaf roll disease during the year of infection will cause an objectionable internal discoloration of the tubers of some varieties, including Russet Burbank and Green Mountain, and in some areas seriously lowers yield. Disease-carrying insects become infected by feeding on diseased plants; therefore, basic requirements for successful production of seed or table stock potatoes include the planting of seed free of or very low in virus content, and

controlling the insect pests on the growing crop.

Another cultural practice of importance in growing seed is careful inspection of fields and roguing out diseased plants before they serve as sources from which insects may spread diseases to healthy plants.

PRECAUTIONS

Insecticides are poisonous; handle them with care. **Follow directions and heed all precautions on container labels.**

Insecticides should be kept in closed, well-labeled containers in a dry place where they will not contaminate food or feed, and where children and pets cannot reach them.

In handling insecticides, avoid repeated or prolonged inhalation of dusts and mists and prolonged contact with the skin.

Wear clean, dry clothing and wash hands and face before eating or smoking.

Calcium arsenate, carbaryl (Sevin), DDT, Kelthane, malathion, metaldehyde, methoxychlor, and sulfur can be used safely without special protective clothing or devices if they are in diluted dust or water-spray forms.

Most insecticide concentrates require special precautions in handling. Avoid spilling them on the skin; keep them out of the eyes, nose, and mouth. If you spill concentrate on skin or clothing, wash it off the skin and change clothing immediately. If it gets in the eyes, flush them with plenty of water for 15 minutes, and get medical attention.

Aldrin, chlordane, diazinon, dieldrin, endosulfan, naled, and toxaphene can be absorbed directly through the skin in harmful quantities. When working with these insecticides in any form, take the same precautions as with concentrates.

Carbophenothion, D–D mixture, demeton, Di-Syston, endrin, Guthion, parathion, and Telone are extremely poisonous and may be fatal if swallowed, inhaled, or absorbed through the skin. These highly toxic insecticides should be applied only by a person who is thoroughly familiar with their hazards and who will assume full responsibility for safe use and comply with all the precautions on the labels. Reduce the danger of skin exposure by wearing protective clothing and respiratory devices as specified on the container label.

After applying parathion to the soil, keep all persons and animals off the treated area for 48 hours.

Do not transfer ethylene dibromide, Telone, or D–D mixture from one container to another in a closed room; do not breathe the fumes.

Do not feed tubers from fields treated with aldrin, chlordane, dieldrin, DDT, endosulfan, or endrin to dairy animals.

Do not apply endrin after cracks in the soil begin to expose the tubers.

To protect fish, wildlife, and water resources, be careful not to contaminate streams, lakes, or ponds with insecticides. Do not clean spraying equipment or dump excess spray material near such water. Avoid contaminating pasture grass or feed.

Avoid drift of insecticide sprays to nearby crops or livestock. Avoid drift of insecticides into bee yards. Growers should notify beekeepers at least 48 hours before dusting or spraying large acreages, so that measures can be taken to protect the bees.

Carefully dispose of empty containers and surplus insecticide. Use a sanitary landfill dump, if possible. If a dump is not available, burn empty insecticide bags and cardboard containers in the open and bury the ashes in an isolated place where they will not contaminate water supplies. Keep out of the smoke. Break or crush glass and metal containers and bury in an isolated place where they will not contaminate water supplies. Pour excess insecticides into a hole dug in level ground in an isolated place where they will not contaminate water supplies, and cover with dirt to a depth of at least 18 inches.

CARE OF EQUIPMENT

Before the season starts, carefully check your application equipment. See that it is in proper working order, and calibrate it so you can adjust it to apply the amount of insecticide mixture required for good coverage.

Inspect your equipment frequently throughout the season to insure proper application rates. Clean and adjust the spray or dust nozzles as often as necessary to maintain uniform delivery of the insecticide mixture. Make correction or replacement as soon as you detect any defect.

MIXING A SPRAY

In preparing a spray, first refer to the table and to the ingredient label on the insecticide package; determine the quantity of stock insecticide (concentrate) to apply to each acre. Then multiply this figure by the number of acres to be treated with a tankful, or one spray mix. This will tell you the quantity of insecticide concentrate to use in each spray mix.

Weigh or measure the exact amount of insecticide concentrate to be put into each tankful of mixed spray. The strength of most emulsifiable concentrates is given as pounds of active ingredient per gallon, making it convenient to measure the amount needed. When only the percentage by weight is known, the concentrate should be weighed.

Mix the insecticide concentrate into the tank as the tank is being filled with water.

APPLYING A SPRAY

If you are spraying with ground equipment at 200 to 400 pounds of pressure per square inch, use 75 to 150 gallons of spray per acre; or use 20 to 40 gallons per acre at 40 to 80 pounds pressure. If you are

spraying with aircraft use 5 to 8 gallons per acre.

Spray coverage is determined by the number, kind, and placement of nozzles. Adjust nozzles so insecticide will reach and thoroughly cover all infested parts of the plants. For most insects, this requires treatment of both surfaces of all leaves.

Use three or four nozzles for each row. The hollow- or solid-cone type nozzle is preferable to the flat, fan type. Place two nozzles on "drop" pipes—one on each side of the row between the plants—direct them slightly forward so they will deliver the spray to foliage of the lower leaves of the plants. Place one or two nozzles directed downward and slightly forward, to spray the upper halves of plants.

As the plants grow, adjust height of spray boom to achieve the most effective coverage. You can do this by raising or lowering the boom and by substituting longer or shorter drop pipes. With a well-adjusted spray boom, satisfactory coverage can be obtained in winds of 7 or 8 miles an hour. Endosulfan should be applied when there is as little air movement as possible.

Better insecticide coverage can be achieved by using a trailing-boom type sprayer. Unlike conventional-type sprayers, it has no overhead boom. Instead it has a series of boomlets, each of which is mounted on a metal shoe that slides over the surface of the soil between two rows. Each boomlet has several nozzles, some of which are directed downward and out from the top, and others upward and out from the bottom. Those at the bottom follow behind a specially designed vine lifter in a manner that directs insecticide to the undersides of leaves.

APPLYING A DUST

If you use ground equipment, apply 25 to 35 pounds of dust per acre. If you use aircraft, adjust equipment to apply 30 to 35 pounds of dust per acre. However, be sure to adjust the dosage and the equipment so you do not exceed the amount of active ingredient per acre stated in the table.

Dust coverage is influenced by velocity of dust as it leaves the nozzle, by wind velocity around the plants, and by whether or not the expelled dust is confined closely around the plants.

Most row-crop dusters require at

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Tractor-mounted dust applicator equipped with a trailing apron to reduce drift of insecticide.

least two nozzles per row for efficient coverage of large plants. In some cases three nozzles are preferable—one for each side of the row, and one delivering dust from above.

If wind velocity exceeds 3 miles an hour, attach to the duster boom a trailing apron 8 to 15 feet long; it can be made of 9-ounce cotton ducking. When the duster moves at 3 to 4 miles an hour, the apron will confine the dust long enough to insure adequate coverage of foliage. The apron will remain spread out over the plants during dusting if you weight its outer rim with a rope.

TIMING APPLICATIONS

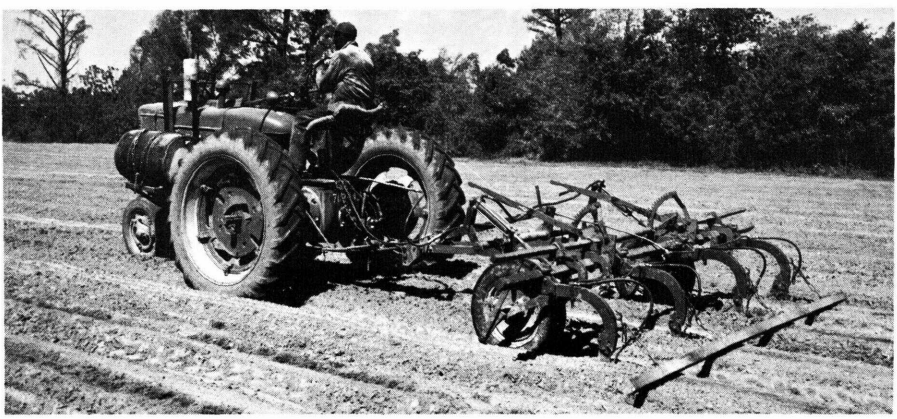
You can save time, effort, and money by properly timing your applications. If the insects that attack your crops occur each year, apply insecticide before damaging infestations have had a chance to develop.

In many instances it is not possible to forecast insect outbreaks. Then, you should apply insecticide as soon as possible after infestation or damage is detected. It is important to make frequent inspections.

One or two properly timed applications of an insecticide may control some pests as effectively as weekly applications made throughout the season. During some years, the kinds of pests may change as the season advances, and additional applications of the same or different insecticide must be used.

Early, repeated applications help prevent development of damaging numbers of disease-carrying insects such as aphids. In the Northeast, best control of insects that spread virus diseases is obtained by following a schedule of rather frequent applications to the foliage over a period early in the season. In the Northwest, effective control is usually achieved by spreading the applications over the period of June 15 to August 1, or by applying granular Di-Syston to the soil during or shortly after planting.

Refer to the last column of the table to find the most effective schedules for various pests and for different parts of the United States.



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Chisel-type applicators are available for injecting fumigants into the soil for control of wireworms and symphylans.

NONCHEMICAL CONTROLS

You may be able to reduce the need for insecticides by following good cultural practices. These consist primarily of measures you can take to discourage the breeding and development of insect pests. Avoid practices that might destroy predators, parasites, or diseases that kill harmful insects.

The value of cultural and natural controls will depend on local conditions. Consult your extension entomologist or county agricultural agent for suggestions.

Cultural Controls

Seed-corn maggot.—Avoid planting potatoes in soil containing large quantities of partly decayed crop residues. If organic fertilizers are used they should be promptly and thoroughly mixed into the soil. If these precautions cannot be followed, be sure that the cut surfaces of potato seed-pieces are well healed before they are planted or that they are planted when soil conditions are likely to be favorable for rapid healing of the cut seed. The temperature in the storage room or in the soil should be approximately 60° to 70° F. and the relative humidity 85 to 95 percent for at least a week after the seed are cut. The seed-corn maggot will not feed on a sound, well-healed seed-piece.

Aphids.—In the control of aphids it is helpful to destroy their weed hosts such as wild mustards, wild rutabaga, wild radish, hemp nettle, smartweed, and lambsquarters. It is especially important to prevent weeds from developing during early spring in potato fields and in adjacent fallow fields. However, destruction of host plants will not entirely eliminate the need for insecticides.

Natural Controls

Sometimes natural controls will hold down the insect population on potatoes. The most important natural controls are parasitic and predatory insects, fungus diseases, and certain weather conditions. Aphids are particularly subject to these natural controls.

The most important parasites of aphids are tiny, four-winged, wasp-like insects. Females lay their eggs inside the aphids. The eggs hatch into larvae that devour the insides of the aphids' bodies.

Lady beetles are important predators. Both larvae and adults of lady beetles eat large numbers of aphids. Other beneficial predators that feed on aphids are spiders, soldier bugs, assassin bugs, syrphid flies, and lacewing flies.

Parasites and predators of aphids are often killed by insecticides. Protect them when possible. Do not apply insecticides unnecessarily; do not use excessive quantities of insecticides; and choose insecticides least harmful.

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INSECTICIDE RECOMMENDATIONS FOR CONTROL OF INSECTS ON POTATOES

Insect, and section of U.S.	Insecticide	Formulation [1]	Amount, by weight, to apply per acre (active ingredient unless otherwise indicated) [2]	When and where to apply [3]
APHIDS				
Northeastern quarter of U.S.	Endosulfan.	EC or WP.	4 to 8 ounces.	Apply to foliage in July, and repeat if needed. Do not apply endrin after cracks in ridge begin to expose any parts of tubers.
	Endrin.	EC.	4 to 8 ounces.	
	Malathion.	EC or WP.	½ to 1 pound.	
	Parathion.	D, EC, or WP.	3 to 5 ounces.	
	Di-Syston.[4] [5]	G.	1 to 2 pounds.	Apply in fertilizer band or in planting furrow with special applicator attached to planter.
Southeastern quarter of U.S.	Diazinon.	3% D. EC or WP.	25 to 35 pounds, D. 6 to 8 ounces.	Apply to foliage weekly as needed.
	Endosulfan.	D or WP. EC.	¾ to 1½ pounds. ½ to 1 pound.	
	Endrin.	D or EC.	¼ to ½ pound.	
	Parathion.	D, EC, or WP.	4 to 8 ounces.	
	Di-Syston.[4]	G.	2 to 3 pounds.	Apply in furrow as side dressing at planting time.
Northwestern and Southwestern quarters of U.S.	Demeton (not effective in hot, dry areas).	EC.	8 ounces.	In Northwest, apply to foliage of seed crop when aphids appear; apply to table crop June 15 and repeat every 10–12 days to at least August 1. In Southwest, apply as needed. Only endosulfan is recommended for aircraft application.
	Endosulfan.	D or EC.	1 pound (½ pound in Southwest and coastal areas).	
	Endrin.	D or EC.	9 ounces.	
	Parathion.	D, EC, or WP.	12 ounces.	
	Di-Syston.[4]	G.	2½ to 3 pounds.	Apply to soil in bands on both sides of row at planting, except in long-season areas apply to early plantings as side dressing but not later than May 20, or consult local agricultural authority as to best time to apply.

ARMYWORMS Where present.	DDT. Toxaphene.	D, EC, or WP. D or EC.	1½ to 2 pounds. 1½ to 2 pounds.	Apply to nearby vegetation before armyworms reach potato fields. Do not feed treated plants to poultry, dairy animals, or animals being finished for slaughter.
BLISTER BEETLES Where present.	DDT. Naled. Parathion. Toxaphene.	D or WP. EC. D or EC. D, EC, or WP. 10% D. EC.	1½ to 2 pounds. ⅔ to 1 pound. 1 pound. 8 ounces. 25 pounds, D. 1½ to 2 pounds.	Dust or spray the beetles when present in damaging numbers. They usually occur in small sections of field.
CATERPILLARS (Miscellaneous) Where present.	DDT. Endrin. Toxaphene.	D, EC, or WP. D or EC. 10% D. EC.	1½ to 2 pounds. 4 to 8 ounces. 25 pounds, D. 1½ to 2 pounds.	On foliage as needed.
COLORADO POTATO BEETLE Northeastern quarter of U.S.	Aldrin.[5] Carbaryl. DDT.[5] Dieldrin.[5] Guthion.	D, EC, or WP. WP. D or WP. EC. D, EC, or WP. EC.	½ pound. 12 ounces. 1 to 1½ pounds. ½ to 1 pound. 4 to 8 ounces. 6 ounces.	On foliage when 25 percent of stand is present and again after 7 days.
Southeastern quarter of U.S.	Carbaryl. DDT.[5] Endosulfan. Endrin. Dieldrin. Naled.	D or WP. D or WP. EC. D, EC, or WP. D or EC. D, EC, or WP. D or EC.	1 to 2 pounds. 1 to 1½ pounds. ½ to 1 pound. ½ to 1 pound. 4 to 8 ounces. 4 to 8 ounces. 1 pound.	On foliage when eggs begin to hatch; repeat as needed.
Northwestern and Southwestern quarters of U.S.	Carbaryl. DDT. Dieldrin. Endosulfan. Endrin.	D. EC or D. EC. D or EC. D or EC.	1 to 1½ pounds. 1 to 1½ pounds. ½ pound. ½ to 1 pound. 6 to 9 ounces.	On foliage when beetles become abundant, or shortly after eggs hatch and, if needed, after 10 to 14 days.

See footnotes at end of table.

INSECTICIDE RECOMMENDATIONS FOR CONTROL OF INSECTS ON POTATOES—Continued

Insect, and section of U.S.	Insecticide	Formulation [1]	Amount, by weight, to apply per acre (active ingredient unless otherwise indicated) [2]	When and where to apply [3]
CUCUMBER BEETLES Adults Where present.	Carbaryl. DDT. Naled.	D or WP. D or WP. EC. D or EC.	1 pound. 1 to 1½ pounds. ½ to 1 pound. 1 pound.	On foliage as needed.
CUTWORMS Where present.	DDT.	D, G, or WP. EC.	2 pounds. 1 pound.	To soil surface and foliage when cutworms first appear.
EUROPEAN CORN BORER Where present.	DDT. Endrin.	D. EC or WP. EC.	2 pounds. 1 pound. 4 ounces.	On foliage as needed. In New England, apply each week of June and August.
FALSE CHINCH BUG Where present.	Endosulfan. Malathion.	EC. D, EC, or WP.	1 pound. 1 pound.	On foliage of infested plants.
FLEA BEETLES Adults Where present.	Carbaryl. DDT.[5] Dieldrin.[5] Endosulfan.[5] Endrin.[5]	D or WP. EC. D or WP. D, EC, or WP. D or EC. D or EC.	8 to 12 ounces. ⅔ to 1 pound. 1 to 1½ pounds. ½ pound. ½ or 1 pound. 5 to 9 ounces.	On foliage. In Southeast as needed; elsewhere when 25 percent of stand is present and 7 days later.
GARDEN SYMPHYLAN Northwestern quarter of U.S.	Parathion.	EC or WP.	5 pounds.	Broadcast on soil before planting and immediately work thoroughly into upper 6 inches.
	D-D mixture. Telone.	Liquid fumigant. Liquid fumigant.	30 gallons. 30 gallons.	Apply with chisel applicator. Follow with ring roller or smyzer. Do not plant within 3 weeks. Soil temperatures should be above 40° F.

GRASSHOPPERS Where present.	Aldrin. Toxaphene.	EC or WP. D. D. EC or WP. 1% B.	4 ounces. 6 ounces. 2½ pounds. 1½ pounds. 20 pounds, B.	To nearby vegetation before insects reach potato fields; repeat as needed. Do not feed treated plants to poultry, dairy animals, or animals being finished for slaughter.
LEAFHOPPERS Where present.	DDT. Endosulfan. Malathion. Methoxychlor. Parathion.	D or WP. EC. EC. EC. WP. D, EC, or WP.	1 to 1½ pounds. ⅔ to 1 pound. ½ to 1 pound. ½ to 1 pound. 2¼ pounds. 4 to 8 ounces.	On foliage when leafhoppers first appear; repeat every 10 days as needed.
LEAF MINERS Southeastern and Southwestern quarters of U.S.	Diazinon. Guthion. Parathion.	EC or WP. D. EC or WP. D, EC, or WP.	6 to 8 ounces. 7 to 10 ounces. 6 to 8 ounces. 8 ounces.	On foliage as needed.
MILLIPEDES Northwestern and Northeastern quarters of U.S.	DDT.	D.	3 pounds.	On foliage or soil surface as needed.
MITES Northwestern quarter of U.S. Where present.	Carbophenothion.	EC.	1 pound.	On foliage as needed.
	Kelthane. Kelthane+sulfur. Parathion+sulfur.	D or EC. 4%+50% D. 2% parathion+50% sulfur, in D.	1 pound. 1½ pounds Kelthane. 12 ounces parathion.	
MOLE CRICKETS Southeastern quarter of U.S.	Chlordane.	D, EC, G, or WP.	2 pounds.[6]	Broadcast on soil surface before planting.
PLANT BUGS (including shield-shaped bugs). Where present.	DDT. Endosulfan. Parathion.	D or WP. EC. EC. D, EC, or WP.	1½ to 2 pounds. ½ to 1 pound. ½ to 1 pound. 4 to 8 ounces.	On foliage as needed.

See footnotes at end of table.

INSECTICIDE RECOMMENDATIONS FOR CONTROL OF INSECTS ON POTATOES—Continued

Insect, and section of U.S.	Insecticide	Formulation [1]	Amount, by weight, to apply per acre (active ingredient unless otherwise indicated) [2]	When and where to apply [3]
POTATO PSYLLID Where present.	Di-Syston.	G.	2½ to 3 pounds.	Apply to soil in bands on both sides of row at planting time.
	DDT.	D. EC or WP.	1 to 1¾ pounds. 1 pound.	On foliage when 1 adult is found per 100 sweeps; repeat every 2 weeks 4 or 5 times.
	Parathion.	D.	4 to 8 ounces.	
POTATO TUBERWORM In field in Southwestern and Southeastern quarters of U.S.	DDT. Endosulfan. Endrin. Guthion.	EC. D or EC. EC. D, EC, or WP.	1 pound. ½ to 1 pound. 6 ounces. 8 ounces.	On foliage when tuberworms begin to web leaves together; repeat in 10 days.
In stored seed potatoes in Southeastern and Southwestern quarters of U.S.	DDT.	5% D.	1½ to 2 ounces per 100 pounds of tubers.	Apply on seed stock only. Do not use treated tubers for food or feed.
	Methoxychlor.	5% D.	1½ to 2 ounces per 100 pounds of tubers.	
SLUGS Where present.	Metaldehyde+chlordane. Metaldehyde+calcium arsenate.	2½% metaldehyde+5% chlordane, B. 2½% metaldehyde+5% calcium arsenate, B.	10 pounds of bait. 10 pounds of bait.	Broadcast on soil late in day when damage is observed.
SOUTHERN POTATO WIREWORM Southeastern quarter of U.S.	Diazinon. Parathion.	EC, G, or WP. EC, G, or WP.	1½ to 2 pounds. 3 pounds.	Broadcast on soil and immediately work thoroughly into upper 4 to 6 inches with double-disk harrow. Consult local agricultural authority as to best time to apply. If soil is to be turned to a depth of more than 6 inches, apply either 3 weeks before plowing or wait until soil has settled.

THREE-LINED POTATO BEETLE Northeastern quarter of U.S.	Carbaryl. DDT. Endosulfan.	EC. D or WP. EC. EC.	½ pound. 1½ to 2 pounds. ⅔ to 1 pound. ½ pound.	On foliage as needed.
THRIPS Where present.	Aldrin. DDT. Parathion.	D or EC. D. EC. D, EC, or WP.	¼ to ½ pound. 1 to 1½ pounds. ⅔ to 1 pound. 4 to 8 ounces.	On foliage as needed.
VEGETABLE WEEVIL Southeastern and Southwestern quarters of U.S.	DDT. Dieldrin. Parathion.	D or WP. EC. D, EC, or WP. D, EC, or WP.	1 to 1½ pounds. ¾ pound. 4 to 8 ounces. 8 ounces.	On foliage as needed.
WHITEFLIES Where present.	DDT. Dieldrin. Endosulfan.	D or WP. EC. D or EC. EC.	1½ pounds. 1 pound. ½ pound. ½ to 1 pound.	On foliage when adults become abundant.
WHITE-FRINGED BEETLE GRUBS Where present.	Chlordane. DDT.	EC, G, or WP. EC, G, or WP.	5 pounds. 10 pounds.	Broadcast on soil when preparing for planting and thoroughly work into upper 3 inches. Do not repeat applications for at least 3 years.
WHITE GRUBS Where present.	Chlordane. DDT.	EC, G, or WP. EC, G, or WP.	4 to 10 pounds. 10 pounds.	To soil surface before planting and thoroughly work into upper 4 to 6 inches. Do not repeat applications for at least 3 years.
WIREWORMS Northeastern quarter of U.S.	Chlordane. Diazinon.[5]	EC, G, or WP. EC, G, or WP.	4 to 8 pounds. 1½ to 2 pounds.	Broadcast on soil before planting and thoroughly work into upper 4 to 6 inches. Do not repeat applications of chlordane for at least 3 years.

See footnotes at end of table.

INSECTICIDE RECOMMENDATIONS FOR CONTROL OF INSECTS ON POTATOES—Continued

Insect, and section of U.S.	Insecticide	Formulation [1]	Amount, by weight, to apply per acre (active ingredient unless otherwise indicated) [2]	When and where to apply [3]
WIREWORMS—Cont. Southeastern quarter of U.S.	Chlordane.	EC, G, or WP.	4 to 8 pounds.[6]	Broadcast on soil before planting and immediately work it thoroughly into the upper 4 to 6 inches.
Northwestern and Southwestern quarters of U.S.	DDT.	EC or WP.	10 pounds.[6]	Broadcast on soil before planting or after harvest and thoroughly work into upper 6 to 9 inches. Apply DDT in the fall or at least 3 months before planting.
	Diazinon. Parathion.	G. G.	3 pounds. 4 pounds.	Broadcast on soil and immediately work into upper 6 to 9 inches at least 1 week before planting. Soil temperature should be at least 50° F.
	Ethylene dibromide. Telone.	83% solution. Liquid fumigant.	3 gallons. 20 gallons.	Inject 8 inches deep into fallow soil every 12 inches. Do not apply within 3 weeks before planting.

[1] B=bait; D=dust; EC=emulsifiable concentrate; G=granules; WP=wettable powder.

[2] Maximum dosage unless range is indicated. Lower dosages may be effective under some local conditions; consult your extension entomologist or county agricultural agent.

[3] Do not apply demeton within 21 days, Di-Syston within 75 days, diazinon within 14 days, Guthion within 7 days, parathion within 5 days, or dieldrin or endrin within 3 days before harvest.

[4] Observations towards the end of the season may show need for supplemental applications of other insecticides in some areas.

[5] Not effective in some sections.

[6] Do not repeat applications at this dosage for at least 3 years.

U.S. GOVERNMENT PRINTING OFFICE: 1964 O—757-339